



## Brook Road Culvert Replacement

### Full Mitigation Best Practice Story

#### *Cumberland County, Maine*

**Falmouth, ME** – Two major storms, Hurricane Bob in 1991 and a severe storm in 1996, damaged significant parts of Brook Road in Falmouth, Maine. The damage totaled approximately \$300,000 and \$19,297 respectively, and forced officials to close the road to traffic anytime heavy rains caused water to flow over the roadway. Bisecting Falmouth, Brook Road carries an estimated 3,500 vehicles each day between West Falmouth and Westbrook to Route 302 and serves as a vital transportation link connecting the Maine Turnpike to Interstate 295.



“The road was flooded out and closed twice. It is a major traffic connector. A lot of commuter and regular traffic use the road. It was a serious situation and absolutely had to be corrected,” said Public Works Director Tony Hayes. After Hurricane Bob, the town began tracking vulnerable roads within its 88-mile road system.

Meander Brook flowed under Brook Road, following a deep ravine on its way to the Presumpscot River. The brook passed through a 54-inch corrugated metal pipe, down to a four- by six-foot granite stone box, leading finally to a 60-inch metal pipe. Six to seven feet of cover material served as the base for the paved road. Public Works engineers determined that the culvert was undersized and caused a pool of water about 25 feet deep to form on the upstream side of the road during heavy rains. The water often overtopped the roadway and flowed down the road where it undermined a 100-year-old barn. The pond caused by the restricted flow created a real danger: the dam formed by the road could wash out, and motorists attempting to drive through the water would be swept into the ravine. To prevent this from happening, the town had to barricade the road during storms.

Following a severe storm in October 1999, a total of \$1,192,193 from the U.S. Department of Housing and Urban Development and administered by FEMA Region I was set aside for five mitigation projects, including Brook Road. These projects were selected from Maine’s Hazard Mitigation Grant Program (HMGP) proposals for which HMGP money was not available. As with FEMA HMGP projects, funding for Brook Road was based on a Federal share of 75 percent, with the Town of Falmouth providing the remaining 25 percent of the project costs.

The project included excavating the ravine on Brook Road and replacing undersized culverts with a 90-inch high-density polyethylene pipe. This pipe was transported to the site in three 40-foot sections. With the new pipes laid end to end, crews joined them on-site with an extrusion weld to form a single unit. A clay base and fill prevents stream infiltration and scouring around the pipe. Concrete headwalls were also installed. Lastly, the fill was added, enabling the road to be widened to allow for a shoulder, guard rails, and a slope.

The spring of 2005 brought another severe storm and flooding, which resulted in a major disaster declaration for the State of Maine. The Brook Road mitigation project performed as designed and the roadway suffered no damage.

“The project went off very smoothly. We are very pleased with the whole process and the results,” Mr. Hayes proclaimed.

#### Activity/Project Location

Geographical Area: **Single County in a State**

FEMA Region: **Region I**

State: **Maine**

County: **Cumberland County**

City/Community: **Falmouth Foreside**

### Key Activity/Project Information

Sector: **Public**  
Hazard Type: **Flooding**  
Activity/Project Type: **Utility Protective Measures**  
Activity/Project Start Date: **09/2002**  
Activity/Project End Date: **10/2002**  
Funding Source: **Other Federal Agencies (OFA)**  
Funding Recipient: **Local Government**

### Activity/Project Economic Analysis

Cost: **\$144,627.00 (Actual)**

### Activity/Project Disaster Information

Mitigation Resulted From Federal Disaster? **Yes**  
Federal Disaster #: **1263 , 01/21/1999**  
Federal Disaster Year: **1999**  
Value Tested By Disaster? **Yes**  
Tested By Federal Disaster #: **No Federal Disaster specified**  
Year First Tested: **2005**  
Repetitive Loss Property? **Unknown**

### Reference URLs

Reference URL 1: <http://www.town.falmouth.me.us/>  
Reference URL 2: <http://www.fema.gov/government/grant/index.shtm>

### Main Points

- Brook Road, a vital transportation link, was damaged by flooding during two major storms, and had to be closed to traffic anytime water flowed over the roadway.
- A mitigation project was undertaken to replace undersized culverts with a 90-inch high-density polyethylene pipe



To hold the new large culvert in place, two pipe cradles were installed.



Three 40-foot long sections were lowered as one pipe into the excavation.



Falmouth Public Works Director Tony Hayes examines the new 90-inch culvert.